Small Business Innovation Research/Small Business Tech Transfer

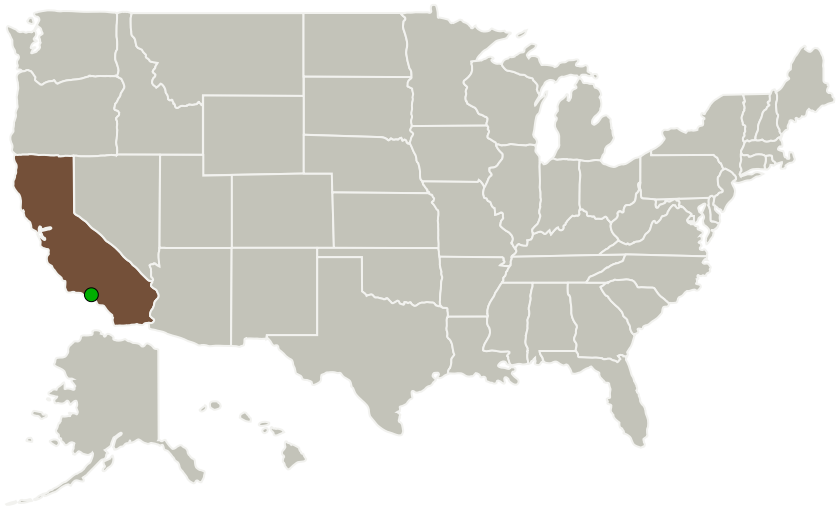
Model Annotations and Tools for Teamwork, Execution, and Reuse (MATTER), Phase I

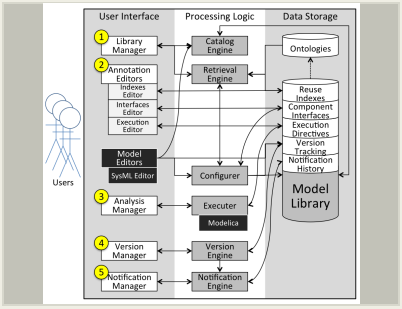
Completed Technology Project (2016 - 2016)

Project Introduction

In order to carry out space-based science missions, NASA is responsible for designing, developing, and operating very complex, long-lived, and expensive systems. Early investment in analyzing a wide range of options can produce markedly better designs. That means pervasive modeling and simulation (M&S) early in conceptual design could pay large dividends for NASA, especially if M&S were cheaper to carry out, and if resulting models could be exploited throughout and across projects. We propose to develop Model Annotations and Tools for Teamwork, Execution, and Reuse (MATTER). This innovative technology will increase the efficiency and value of model-based systems engineering (MBSE). MATTER will improve on existing SysML-based MBSE by defining new types of metadata that enable valuable processing capabilities not supported by the standard SysML language and existing tools: (1) Semantic descriptions capturing the intended uses of model fragments will encourage reuse, when combined with tools for managing and searching a model library; (2) Additional descriptions of model component interfaces will enable efficient composition and configuration of models; (3) Annotations on the behaviors and constraints of model elements will ease automation of simulation generation and analysis; (4) Tracking of model changes--including version branches representing alternate designs--will facilitate flexible trade analysis, model continuity and evolution across the project lifecycle, and teamwork; and (5) Generation and routing of change notifications will further coordinate team efforts, as awareness of shifts in inputs or the irrelevance of intended outputs will reduce wasted work. During this project, we will design the system and develop a software prototype that illustrates the feasibility and utility of this approach.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Stottler Henke Associates, Inc.	Lead Organization	Industry	San Mateo, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Project Transitions

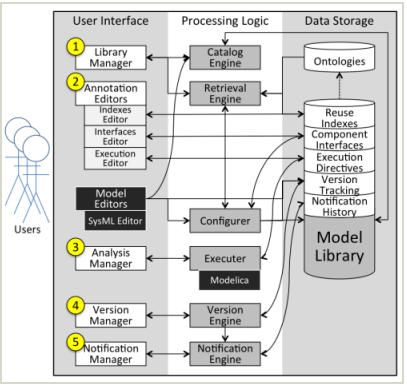
June 2016: Project Start

December 2016: Closed out

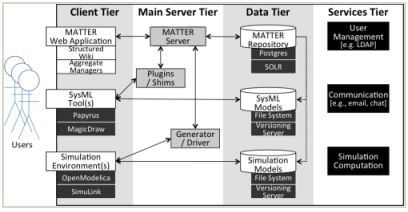
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139761)*

Images



Briefing Chart Image
Model Annotations and Tools for Teamwork, Execution, and Reuse (MATTER), Phase I *(https://techport.nasa.gov/image/127338)*



Final Summary Chart Image
Model Annotations and Tools for Teamwork, Execution, and Reuse (MATTER), Phase I Project Image *(https://techport.nasa.gov/image/136286)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Stottler Henke Associates, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

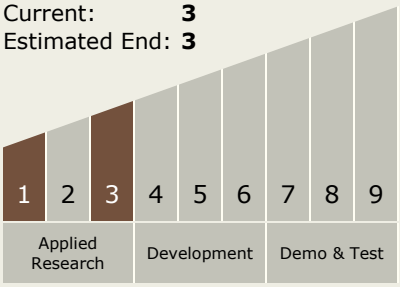
Carlos Torrez

Principal Investigator:

Eric A Domeshek

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.4 Collaborative Science and Engineering

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System